THE IMPLEMENTATION OF ROAD SAFETY AUDIT IN NEW ZEALAND

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1. INTERNATIONAL RECOGNITION AND OUTLINE

1.1 Institute Of Transportation Engineers Award

At its annual meeting in Boston in August 1997, the Institute of Transportation Engineers (ITE) awarded its Edmund R Ricker Traffic safety award to Transit New Zealand for the implementation of the road safety audit programme. The citation said

"TRANSIT NEW ZEALAND: In recognition of their efforts in promoting and implementing roadway safety audits in New Zealand and throughout the world.

TRANSIT NEW ZEALAND has been a leader in recognising the value of road safety audits. They established the position of Safety Audit Manager in 1990 and have continued to encourage the use of safety audits by developing training courses, supporting demonstration projects by local governments and conducting pilot audits on the existing roadway network. They have prepared a series of reports summarising their findings and disseminating the results of their work at meetings and through the publications of professional organisations."

The author was invited to attend the ITE annual meeting in Boston and to accept the award on behalf of Transit New Zealand. In addition, the author was invited to address the annual meeting at a session sponsored by the ITE Transportation Safety Council. The author chose to speak on the factors that prevailed in New Zealand which favoured the successful implementation of the road safety audit programme. This paper is an expansion of that presentation. Other countries or authorities considering implementing such a programme might benefit from New Zealand's experience.

1.2 FHWA Technical Scanning Tour

In October 1996, the US Federal Highway Administration (FHWA) sent a team on a tour of authorities in Australia and New Zealand to investigate the road safety audit programmes in operation there. The author is grateful to that Scanning Tour team for enquiring into aspects of organisations and administration which may have contributed to the implementation of the programme. It is extremely valuable to have external independent experts enquire in this way and to give an impartial view. The author has drawn on views expressed in the FHWA team's report. (FHWA 1997)

1.2 Outline of this Paper

In section 2, the author identifies what he means by "safety audit" as the words have several meanings. Then in sections 3 and 4, New Zealand is put into context in terms of its population, geography and its management of roads. Next, the author outlines, in section 5, the factors that he believes helped New Zealand to implement its safety audit programme. The actual development and implementation of that programme is described in section 6, while concerns about the programme and what should be done about them are the subjects of section 7.

2. WHAT IS SAFETY AUDIT?

The words “Safety Audit” mean different things to different people. So, it is important to define its use in any context.

Safety Audit: In the road and traffic engineering disciplines, the words “safety audit” were used first in New Zealand in 1990. They are used for a process, which is part of the design and construction process to ensure that works are built as safely as is practical. The process identifies potential safety problems before they become real ones. In this context, safety audit is an operational activity. It is a process of crash prevention.

Road safety audit is described in the Austroads Road Safety Audit Guide (1994) as *“a formal examination of an existing or future road or traffic project, or any project which interacts with road users, in which an independent, qualified examiner reports on the project’s accident potential and safety performance.”*

Safety Audit Model. In New Zealand, the transport sector has changed substantially from the days when central government ran almost everything. Reforms over the past two decades have removed government from commercial operations. The way government now caters for public safety is to set the rules for entry into a sector, grant entry, audit for compliance with the rules and remove or remedy those who do not comply. The Ministry of Transport (MOT) calls this the *“Safety Audit Model*”. It was introduced first into the aviation sector.

In the land transport sector, the Land Transport Safety Authority (LTSA) is charged with implementing this safety audit model in the land transport sector. It is being applied to “operators” like the taxi industry or warrant of fitness testing stations. The model cannot be applied to road controlling authorities so readily. One reason is that the removal of an operator from the industry is not a model that can be applied easily to road controlling authorities.

This paper is about the road safety audit as it applies to new works (which elsewhere may be called schemes or projects). However, the paper does not describe any aspects of road safety audits. There are many excellent manuals, which describe road safety audits in some detail. For those countries whose first language is English, the main documents are:

- The Austroads guide (Austroads 1994);
- The Institution of Highways and Transportation Guide (IHT 1996)
- Transit New Zealand (Transit New Zealand 1993)
- Institute of Transportation Engineers Informational Report. (ITE 1995)

The author is aware of guides in other languages, for example in Norwegian and Danish.

2. NEW ZEALAND IN CONTEXT

New Zealand is a small country comprising two main islands. While in land area it is about the same size as Japan, the British Isles or California, it is sparsely populated, with only 3.7 million people, the majority of whom live in the North Island. Auckland is the largest metropolitan area with a population of about 1 million. The country’s population is spread amongst 8 cities with a population over 100,000 persons and 11 smaller provincial centres with a population over

50,000 persons. This means that travel between centres is significant and, as a consequence, the majority of fatal crashes happen in rural areas.

Geologically New Zealand is a young country and, being on the Pacific Rim, it suffers from earthquakes and has thermal areas and some active volcanoes. It is a mountainous country the highest peak being Mt. Cook at 3764 m. which is part of an alpine spine that traverses down a large portion of the South Island. The difficult and often unstable country has an impact on the standards of roads that can be provided in some places.

New Zealand has one of the highest vehicle ownership in the world with 65 registered vehicles per 100 population.

For such a low population and with its geographical constraints, New Zealand has a relatively extensive network of roads. There are 91,864 km. of public roads of which about 60% are sealed. Of this length, 10,643 km. are the national network of State highways, and the remaining 81,221 km. are local authority roads. There were 10,564 reported casualty crashes in 1996, and these resulted in 514 deaths and 14,796 injuries.

4. THE MANAGEMENT OF ROADS IN NEW ZEALAND

Before discussing factors in New Zealand, which assisted the implementation of the road safety audit programme, the reader needs to know the organisational structures for the management of roads.

During the first half of the 1980s the management of roads lay entirely within the government, either central or local. In addition the majority of the physical works undertaken on roads was undertaken by government's own work forces, again either central or local government. However, in the latter part of the 1980s, a major step was taken towards a more commercial model. The central government's workforce was made into two State Owned Enterprises (SOEs), and the management of the state highway network was made the responsibility of a new Crown Entity called Transit New Zealand, hereafter called "Transit".

Transit reports through its General Manager to an independent authority, which operates like a company board. Appointed by the Government and reporting to the Minister of Transport, the Transit New Zealand Authority directs overall policy.

In the 1990s further steps were taken. Local authorities, in order to attract central government funding, adopted the same model for their workforces, creating LATEs (Local Authority Trading Enterprises). All works on both State highways and local roads had to be competitively tendered. The central government sold its two SOEs, some local authorities have contracted the management of their networks to private sector firms.

In 1996, Transit was split into two parts, termed the "funder/provider" split. Its funding and auditing responsibilities became the role of a new agency called Transfund New Zealand, hereafter called "Transfund". Transit retained its role as the manager of the national State highway network.
During 1997 there has been much debate about the future management of roads in New Zealand. The MOT has produced two discussion documents (MOT 1996, 1997). The options

being considered include the full commercialisation of the management of roads. At the time of writing this paper, the Government has not announced any decisions.

5. FACTORS WHICH HELPED NEW ZEALAND TO IMPLEMENT ITS SAFETY AUDIT PROGRAMME

5.1 Size

New Zealand is a small country. As a result, in any profession, it is possible to know many of its members personally. The professional body IPENZ (Institution of Professional Engineers of New Zealand) and more especially its Transportation Group provides an excellent avenue for networking. It holds an annual workshop at which problems can be discussed, ideas promoted and progress can be reported. Usually about 150 persons attend these workshops, most of them being practising engineers.

The Transportation Group produces a regular newsletter called “Roundabout” in which informal articles, views and requests are published. Communication within the profession is good.

5.2 Levels of Government

In New Zealand there are three levels of government: National, Regional and Local Government. In respect of the management of roads, regional government plays little part. Its functions are mostly at the strategic level. At a national level there is only one house, the House of Representatives. Compare this with some countries where there are two houses at the national (federal) level and two houses at the state level. New Zealand does not suffer from many layers of bureaucracy. It means that when a decision is made to develop and then implement a new policy or process, it is possible to move at a fast rate. That is not to say that the implementation of new policies is always rapid, only that it can be. There are 74 local authorities.

5.3 Legislation

Transit had the authority to develop and implement a safety audit policy. There was no need for any change in legislation. There was no need to seek approval from any other agency. Transit went ahead with the work in its pursuit of building roads as safely as possible.

5.4 Co-ordination

There is co-ordination of road safety programmes at the highest level through the National Road Safety Committee (NRSC), which comprises the chief executives of the MOT, Police, LTSA, Transit and the Accident Compensation Corporation. The improved co-ordination and co-operation between the main agencies has, in the author’s opinion, been a significant factor in improving road safety in New Zealand over the past decade.

The existence of the NRSC ensures that road safety programmes are treated seriously, and that there is a commitment at the highest level.

5.5 Quality Culture

Total Quality Management (TQM) and Quality Assurance (QA) are amongst the management trends of the 1990s. Transit has adopted the TQM philosophy, and is requiring its suppliers to be “quality assured”. To demonstrate leadership in the profession, Transit undertook to seek ISO 9000 accreditation for critical parts of its operation. In 1997, its Review and Audit Division (now part of Transfund) received its ISO 9002 accreditation.

Safety Audit is a quality process. It fits in well with the quality climate of management philosophy. It can be a process within a QA system. The cliché “Get it right first time” applies, and that is exactly what safety audit tries to do. The author sees no conflict between safety audit and QA.

5.6 Champion

For new programmes to succeed, it is very helpful to have a champion, someone who will devote energy to driving the implementation forward. In New Zealand, the author was that champion. But for a champion to be effective, he or she must be empowered by management. Transit provided that empowerment through the support from the General Manager and his senior management team.

In addition, a champion cannot be effective if the profession as a whole does not believe in the programme being promoted. Engineers in both private and public sector saw the benefits of safety audit and supported its implementation. No obstacles were placed in the way.

5.7 Legal Problems

At the initial stages of developing a safety audit programme, questions were raised about the legal position and liability issues. It would appear that these issues may be a serious impediment in some countries. But in New Zealand, there is a national fault free accident compensation scheme. It is funded by employer and employee levies. As a result of the introduction of this accident compensation scheme in 1974, New Zealanders forfeited the right to sue for personal injury. Thus persons injured in road crashes cannot sue road controlling authorities for any real or perceived defects in the road.

Nevertheless, legal advice was sought on what effect a safety audit programme would have on the existing legal responsibilities and liabilities. The advice was that such a programme would make no difference.

There is a very good chapter on legal issues in the Austroads Guide (Austroads 1994).

5.8 Summary

In summary, then, certain factors combined to make the environment favourable for the introduction of the safety audit programme.
These were:

- There is good networking amongst professionals;
- New Zealand does not have many levels of government bureaucracy;

- No changes to legislation were required;
- Road Safety programmes are co-ordinated at the highest level ensuring commitment and co-operation between agencies;
- A “Quality” culture had been adopted and safety audit is a “quality” process;
- A champion was empowered by management; and
- There were no legal implications.

6. DEVELOPMENT AND IMPLEMENTATION OF SAFETY AUDIT IN NEW ZEALAND

6.1 Identify

Transit was created in 1989. In its structure was a Review and Audit Division, within which was created the position of Safety Audit Manager. The author was appointed to that position in 1990.

Guided by similar work in other branches of engineering, a series of post construction safety audits were conducted. A series of recently completed safety improvements projects were examined from conception to final completion. At each stage the auditors, who were consultants employed for their skills and experience, examined the documentation and made a judgement as to whether safety had been given due consideration.

The results of this series of audits were a surprise to the author. In some cases, actions that should have been taken were not taken. As a result, rework was required. For example: In one case of an intersection improvement, the detailed design had a number of changes, which were required by the client. But the changes were not implemented. In another case of a rural realignment, while the construction work was well done, the line markings, marker posts and reflective raised pavement markers had not been installed. At night, the realignment was a “black hole”.

While the audits’ recommendations would improve the selected projects, the recommendations were made too late. They were made some time after the projects were supposedly completed. Also, only a very small percentage of safety improvements could be audited in this way.

This series of post construction safety audits identified the need for an audit process that identifies deficiencies **before construction.** In addition, a process needed to be developed which had the potential of being applied to a larger proportion of the projects.

The author was aware that such a programme of safety audits had been pioneered in Kent County Council in the UK under the leadership of Malcolm Bulpitt. The Institution of Highways and Transportation published the first safety audit guide in 1990 (IHT 1990). The UK Department of Transport published its Standard (DOT 1990a) and Advice Note (DOT 1990b). The standard became mandatory on all Trunk Road Schemes from 1 April 1991.

6.2 Overseas Connection

In his previous employment with the MOT, the author was responsible for establishing and developing the Ministry’s capability in conducting crash reduction studies (previously called accident investigation studies). During the course of that work, the author had established good

contacts with the UK especially with Devon County Council and The Transport and Road Research Laboratory (TRRL).

The author called upon these contacts to assist in promoting the safety audit concepts in New Zealand. Firstly, Mike Goodge, ex Devon County Council, and then with ACER Consultants, came to New Zealand and conducted some introductory workshops. These workshops introduced the concepts of safety audit to the industry.

Next, Barbara Sabey, ex TRRL, and now a consultant, together with Mike Goodge, organised a study tour for the author, which included attendance at training courses. The report of the study tour (Appleton 1992) recommended that:

- a working party be set up to develop safety audit procedures;
- pilot safety audits be undertaken; and
- training courses be run.

Transit adopted these recommendations.

6.3 Pilot Audits and Initial Training Courses

Mike Goodge was invited to return to New Zealand to lead four pilot safety audit teams. Four Transit Regional Offices chose one or more State highway projects to be used for these demonstration audits. Large teams of five people each were set up to conduct these audits under the leadership of Mr Goodge. Large teams were chosen as a means of providing training on the job. These audits were followed immediately by a training course, which used some of the pilot audits as practical examples. The demonstration projects and training courses were well received.

The next step was to invite Phil Jordan from Vicroads to help with further demonstration projects. Phil had worked with Mike Goodge in Oxfordshire County Council and had been instrumental in writing the Vicroads Safety Audit Manual. The same format was followed. The three remaining Transit Regional Offices were used. Again, teams of five were selected for training on the job. These series of safety audits were followed by a series of training courses, again using the pilot audits as worked example.

These demonstration projects and initial training courses essentially raised the awareness of safety audit and provided a large number of engineers with exposure to the safety audit process. This, in turn, helped with selling the safety audit concepts to management.

6.4 Working Party

The author set up a Working Party with representatives of Transit, consultants, Local Authorities and the LTSA. Some of the working party had been members of the pilot safety audit teams and had participated in the training courses. The working party reviewed Australian and British documents, and added their own experience to develop New Zealand's own manual. (Transit 1993). This was published in August 1993.

6.5 The Policy

The Transit Authority had been kept appraised of the progress of the development of the procedures. At its meeting, in July 1993, the Transit Authority adopted the policy and procedures for application on state highways. The policy was applied to a 20% sample of State highway projects annually from 1 July 1993. There was no requirement for the local authority sector to adopt the policy.

6.6 Demonstration Projects in the Local Authority Sector

To promote the safety audit concepts in the local authority sector, the author commissioned seven consultants to lead teams of local authority engineers. These consultants had been members of the State highway pilot audit teams. Essentially groups of local authority engineers audited each other's projects under the guidance of the consultant, as the team leader. Thirty local authority engineers took part in these audits, 39 projects were audited. The report of these audits (Appleton 1994a) recommended that safety auditing should not be made mandatory at that time, but that local authorities should be encouraged to adopt it.

6.7 Review of the Implementation of Safety Audit on State Highways

Part of Transit's implementation strategy was to review the experience after one year. The review (Appleton 1994) covered both facts and opinions. It sought the opinions of clients, consultants and auditors. Generally the policy had been implemented as intended. The safety audit process was thought to be a good one. There had been some difficulties but, in the main, these were attributed to the start up phase.

Some advocated the creation of a national list of "approved" auditors, but this was not the consensus. Some audit teams were assembled at short notice and this could lessen the quality of the audit. The most consistent failure of the audit process was that there had been absolutely no feedback to the audit teams on the responses to their reports.

The review resulted in many suggestions but no changes to the policy or procedures document were proposed. Finally the review concluded that there was no mechanism for the experience of safety audits to be shared by the profession as a whole.

6.8 Dissemination of the Results of Safety Audits

As a result of the final conclusion of the review, the author commissioned two reviews of selected safety audits. The purpose was to provide feedback to the "industry" on issues arising from the safety audit process.

Tate (1996) undertook a review of a selection of rural safety audits. A sample of 30 audits was reviewed. The report tabulated the items that occurred most frequently in the reviewed reports. In addition, Tate commented on the audit teams. He noted that a few auditors appeared to have done many of the audits. On the audit process, he noted that Stage 2 audits (Preliminary Design) were undertaken at different points in the design process; and on the audit reports, he noted that there were two distinct styles, being those of Messrs Goodge and Jordan respectively. They led the pilot audit teams.

Gadd (1996) undertook a review of a selection of urban safety audits. A sample of 36 audits was reviewed. Again, the report tabulated the items that occurred most frequently in the

reviewed reports. In addition, Gadd noted that several topics seem to have been omitted or included under too broad a heading in the checklists, and he advocated that an evaluation be carried out as to the cost effectiveness of the safety audit process.

6.9 Training Courses

Mike Goodge and Phil Jordan led the initial training courses following the pilot safety audits on state highway projects. About 180 persons attended that first series of training courses, which provided an excellent exposure to the profession as a whole. But it was recognised that these safety audit training courses provided no more than an exposure to the process. There was no exposure to the technical skills that were needed to undertake a safety audit.

Thus a traffic safety engineering course was developed. It became a 5-day course, which combined the existing course on accident investigation studies with the safety audit training course and added technical sessions on safety engineering. Initially the course was developed and run by Transit New Zealand, but more recently consultancy companies have run it. It has proved a very popular course, with about 30 persons attending each course. The course now runs annually.

6.10 Survey of the Uptake of Safety Audit by Local Authorities

While Transit has adopted the safety audit policy, there was no requirement for local authorities to do the same. Therefore the author commissioned Tony Francis to undertake a survey of the uptake of safety audit by the local authority sector. In his report, Francis (1997) found that a third of local authorities say they undertake safety audits and two thirds do not. The proportion of projects safety audited varies, and only major projects tend to be safety audited. Most followed the Transit procedures.

Among the local authorities that do not undertake safety audits, the lack of major projects was far more important than the availability of funds or staff time. More training and publicity was suggested, with little support for making safety auditing compulsory.

6.11 Operational Activity

Safety audit is now an operational activity. It is an integral part of some road controlling authorities' systems for managing road safety. All parties have generally accepted it as a good process. It is disappointing to see that only one third of local authorities undertake safety audits, though it should be noted that about another one third would not have any suitable projects to audit.

7. DANGERS AND WHAT SHOULD BE DONE ABOUT THEM?

What happens to a programme, any programme, when the champion lets go, and the programme becomes operational? Will the process continue to be implemented as intended?

7.1 Criticisms

The main criticisms that the author hears are:

- Inappropriate auditors are being appointed: for example, auditors with insufficient experience in the type of project being audited and teams of only one person. (both should not happen if the policy is applied as intended);

- Unrealistic recommendations: for example, recommendations that have no chance of being implemented for economic or other reasons or recommendations that are outside the ambit of safety;

- Statements that suggest a lack of understanding of the safety audit process: for example, observations that the recommendations have to be adopted or statements that the audit process does not apply to the planning process.

7.2 Future Efforts and Needs

There are a number of actions that need to be taken to ensure that the safety audit process does not fall into disrepute. These actions include:

- Training and awareness programmes should continue. While the one-week training course provides excellent training for practitioners, restructuring in the local authority sector means that there may be managers who have not been exposed to the earlier awareness campaign. Perhaps this campaign should be revitalised.

- The “inappropriate auditors” criticism must be addressed. With Australian colleagues, the issue of accreditation is being debated. The concept has not found favour in New Zealand. Instead, guidelines for the appointment of safety auditors have been developed and promulgated for comment. The draft guidelines were presented at a recent national workshop. They will be published, and consideration is being given as to the mechanism for their adoption.

- Feedback to the profession needs to continue. As well as publishing the reviews by Tate (1996) and Gadd (1996), the author has commissioned another review of audit reports, this time on roundabouts. The results of this review will be published.

- A review of Transit’s policy and procedures is timely. It is now over four years since Transit adopted its policy. The experience of the clients, consultants and auditors should be reviewed so that this 4 years worth of experience can be harnessed and put into effect. The author has initiated discussions with a view to undertaking such a review.

- International collaboration must continue in order to share ideas and experiences. The development of safety audit in New Zealand has benefited considerably from the active assistance of colleagues from Australia and Britain. Now more countries are adopting safety audit while others are actively considering doing so. It is important to participate in this international collaboration, not only to assist other countries with New Zealand’s experience but also to learn from fresh ideas and fresh approaches.

- An expansion into stage 5 audits has been initiated. The Transit policy covers only stages 1 to 4 audits. Stage 5 audits are of the existing network. Hannah (1996) reported the

development work, based on procedures in use in New South Wales. Draft procedures have been prepared by Beca Carter Hollings and Ferner Ltd., and published by Transit (1996).

8. SUMMARY

In summary, the implementation of safety audit in New Zealand appears to have been successful, though clearly there are areas for improvement. The author believes the main reasons for the success are:

- The right environment existed for the implementation of safety audit;
- The author was empowered by management to be a dedicated champion;
- Overseas assistance was extremely helpful;
- The awareness programme worked, safety audit was seen by all as a good process; and
- Everyone owned the policy and procedures.

The safety audit programme is far from perfect, and there is much work to do to improve it. By documenting the way in which the programme was developed and implemented, the author hopes that others can learn from New Zealand's experience and gain assistance in promoting safety audit themselves.

9. ACKNOWLEDGEMENT

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